





## Chapman Conference on Vertical Crustal Motion: Measurement and Modeling

A Chapman Conference on Vertical Crustal Motion: Measurement and Modeling will be held October 22-26, 1984, in Harpers Ferry, West Virginia.

Convenor: William E. Strange

This conference will bring together scientists who measure vertical crustal motions and those who analyze and model these motions with the primary objective of obtaining close interaction between the two groups. Emphasis will be on vertical crustal motion in North America. Questions to be addressed will be (1) what are the accuracies and error sources associated with each data type? (2) What is the extent of the current data base? (3) How accurately do we know vertical crustal motions in North America? (4) What are realistic expectations of contributions from space systems and other new technologies in the next decade? (5) What is the current status of modeling vertical crustal motions? (6) How important is vertical motion information to understanding and modeling earth dynamics? (7) What are the measurement requirements to support modeling and analysis in terms of temporal and spatial density and accuracy? (8) What are the most critical deficiencies of vertical motion data relative to modeling and analysis?

There will be invited and contributed presentations. The Call for Papers was published in the March 20, 1984, issue of Eos. Abstract deadline is August 1, 1984. Abstracts should be submitted to the American Geophysical Union.

For information on the required abstract format or further meeting logistics, contact:

AGU Meeting Department 2000 Florida Avenue, N.W. Washington, DC 20009 (202) 462-6903	For program information contact: Dr. W. E. Strange NOAA/NOIS/CNGS/NGS/NCG11 6001 Executive Blvd. Rockville, MD 20852 (301) 443-2520
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### Article (cont. from p. 111)

des transmission of data messages automatically.

#### The Actual Experiment

The RST installation in the U.S. restaurant was uneventful and took only 30 min. The actual experiments in three steps were preceded by a brief talk on why and how. Also, the video screen proved very useful for large audience display of terminal operations.

Step 1. RST to RST communication. Automatic dialing and log in on a PDP11/44 running UNIX in Washington, D.C., over the ordinary telephone network using Bell 212 modems. Transfer of waveform data (level II data) and bulletins (level I data) from Washington to Geneva, via immediately

displayed the analog waveforms on the raster scan graphic display screen and the video screen.

Step 2. RST to RST communication. This involved dialing and log in on a PDP11/34 at NORSAR. Kjeller, Norway. From the PDP11/34, we extracted real-time information on the status of the seismic network in southern Norway, including the detection log, which in turn was used to select a few, presumed particular events for display and analysis on the mentioned screens. Also, waveform data from the NORSAR library were extracted and displayed.

Step 3. This involved calling the NORSAR "sister" RST in Trondheim. After establishing the modern link, we were able to demonstrate the RST functions described in the

previous section. To generate some events, we started sampling with a rather low threshold and, behold, E. Thoresen's wife slammed a door at the appropriate moment creating the most spectacular event. This was immediately transferred to the RST in Geneva, and 10 s afterward it was displayed on the video screen.

#### Ad Hoc Demonstration

After the above experiments had been completed, a delegate from Australia asked us whether we could log in on his computer in Canberra. Given the telephone number and password, we could, on the first try, extract local bulletin files, etc. Further, the delegate drafted a message for his colleagues for proof of connection, which in turn was transferred to the Canberra computer. This ad hoc demonstration proved rather convincing: the feasibility of global data exchange.

An important aspect of the above experiments conducted from the U.N. building was that the RST hardware has a price tag of about \$6000, while the Norstar microcomputer itself costs about \$3000.

#### Future Prospects

The next step is to improve both RST and RST, particularly adding a more powerful CPU, an array processor for FFT matrix inversion, etc., and a few megabyte of memory to the RST. This will permit extensive data operations in the field and also allow distributed processing in the nodes of our network.

Additional field functions might include more filtering options, beam forming, spectral analysis, and rough event locations. The RST would then be able to generate automatic bulletins (level I data) and higher quality level II data. The net result will be less communication and thus more cost effective operations.

The RST development will be directed toward the expert-system concept. This means that an RST should administer several RST's and retrieve event data relevant for traditional analysis work and research. It should also have the option to retrieve bulletin files and level I data from foreign data centers, information that would be very helpful in local bulletin work. With such a data base limited at above, combined with advanced analysis routines, interactive analysis, and wave parameter extraction should function expertly. Most important, individual seismologists, particularly those with a knack for microprocessor technology, should be able to participate actively in these developments, even from their studies at home.

#### Acknowledgments

We are much indebted to the Royal Norwegian Ministry of Foreign Affairs for research

grants which made this work possible. Special thanks go to Ambassador Sten Lundbo, Norwegian Mission, Geneva, for support and encouragement and to A. U. Kerr (DARPA) for invaluable conceptual advice. NORSAR contribution 335.

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## Anne Burford to NACOA

Anne Burford, who resigned as administrator of the U.S. Environmental Protection Agency (EPA) in March 1983, has been appointed chairman of the National Advisory Committee on Oceans and Atmosphere (NACOA). Seven others have been appointed to the 18-member committee, which advises the president on ocean and atmosphere policy.

Burford succeeds John A. Knauss as NACOA chairman. Knauss, whose term of office on NACOA officially expired on July 1, had been on the committee for 6 years. Burford resigned from EPA following controversy over hazardous wastes.

In his proposed budget for fiscal 1985, as in recent years, President Ronald Reagan eliminated NACOA. In previous years, Congress has reinstated the committee. Bills (S. 1098 and S. 2538) to reinstate NACOA for fiscal 1985, which begins October 1, have been introduced and have been hotly debated in Congress. A conference between members of the House of Representatives and the Senate to discuss NACOA's future—including reconstituting the committee in a different form—will be held probably between July 23 and August 10.

Also appointed to NACOA are John E. Bennett, a retired Navy captain from Solana Beach, Calif. His term expires in 2 years. William Brewster, vice president and director of the Atlantic Salmon Foundation and chairman of the executive committee of the International Atlantic Salmon Foundation, will serve until July 1985. Lee Gerhard, Getty Professor of Geology at the Colorado School of Mines, has been appointed until July 1986. Judith Kildow, appointed through July 1986, is an associate professor of ocean policy at the Massachusetts Institute of Technology. Mary Ellen McCaffrey, appointed through July 1988, is former administrative assistant to Sen. Slade Gorton of Washington and former director of the department of budget and program development for King County, Wash. Nathan Sonenshein, whose term ex-

pires in 1986, is assistant to the president of Global Marine Development, Inc., of Newport Beach, Calif. Gordon Snow, appointed through 1985, is assistant secretary for resources of the California Resources Agency in Sacramento, Calif.

The next NACOA meeting is August 2 and 3 in Washington, D.C. NACOA meets eight times per year. Steven N. Anastasio is the executive director. —BTR



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## Water in Cirrus Clouds

Meteorologists from the University of Utah have discovered water droplets as cold as -36°C at the base of cirrus clouds, the coldest temperatures at which liquid water has been confirmed in clouds. Because earlier models of radiation transfer in the atmosphere had assumed that the clouds at cirrus layer altitudes (6,000-12,000 m) were composed only of ice crystals, the presence of liquid water may affect how these models are constructed.

A team led by Kenneth Sassen of Utah's Department of Meteorology used ground-based polarization laser radar (lidar) to detect the water droplets in a cirrus cloud layer approximately 8.2 km above Boulder, Colo., last October. By analyzing the polarization of laser light reflected from cloud particles, the lidar system can identify whether the cloud contains water or ice crystals and can provide information on the type and distribution of ice crystals within the cloud.

The lidar results were supported by data from an instrumented aircraft of the National Center for Atmospheric Research (NCAR) in Boulder, which flew through the 1.9-km-thick cirrus cloud near its base, measuring the sizes and concentrations of crystals and droplets. The combined lidar and aircraft data showed that liquid water droplets occurred in a narrow layer at the bottom of the cloud, with a density of up to 130 drops per cubic centimeter and temperatures as low as -35° to -36°C. Within 100 yards above the base of the cloud, the water appeared to freeze rapidly into ice crystals.

The supercooled liquid droplets, according to Sassen, probably are short-lived, lasting "only a matter of minutes" before freezing. At temperatures below -40°C, he said, water is believed to freeze spontaneously. These droplets, however, take some time before they turn to ice. A possible explanation is that there is a relative scarcity of dust particles and other condensation nuclei at the high cirrus altitudes, so that it takes longer for the ice crystals to form than it does at lower altitudes.

Cirrus clouds have been shown to play a part in the transfer of solar and terrestrial radiation through the atmosphere, and this radiation budget in turn has a great effect on global climate and the atmospheric greenhouse effect. Climate modelers have assumed up until now that cirrus clouds were made entirely of ice crystals and have used approxi-

mations of the hexagonal shape of these crystals in their computer models to predict how radiation will be scattered. Water droplets are spherical, though, and they scatter radiation differently than hexagonal crystals. If the water layer is a permanent feature at the base of cirrus clouds, even if the layer is only 100 m thick, it would mean a change in the radiation transfer models. The next step, according to Sassen, is to continue lidar investigations of other cirrus clouds to see if this water layer occurs elsewhere and if the base of the clouds remains watery over a long period of time.

## Congressional Capsule

Several geophysics-related bills were passed as the House of Representatives and the Senate each scrambled to complete as much business as possible before the recess for the Independence Day holiday and the Democratic National Convention. The House and Senate will reconvene July 23.

The Senate ratified the compromise version of the Land Remote-Sensing Commercialization Act (H.R. 3155) (Eos, July 3, 1984, p. 425) in the final hours before recessing. The bill was expected to be sent to President Ronald Reagan for his signature as Eos went to press.

In addition, the House passed H.J. Res. 555, which designates July 20, 1984, as Space Exploration Day, in commemoration of the 15th anniversary of the Apollo 11 moon landing. The House also passed S.J. Res. 257, which designates the year that began July 1, 1984, as the Year of the Ocean (Eos, June 19, 1984, p. 409). The Senate had passed the measure on June 8.

The House approved a version of H.R. 3282 reauthorizing and amending the Clean Water Act. Although the Senate Environment and Public Works Committee reported out the Senate version of the bill 9 months ago, the entire Senate has not voted on the bill.

The House passed the Water Resources Authorization (H.R. 3678) by a 259 to 33 margin on June 29. There is no companion bill in the Senate. The bill details steps for the "conservation and development of water and related resources and the improvement and rehabilitation of the nation's water resources infrastructure." Much of the bill deals with regulating beach erosion, floods, drinking water supplies, and channel navigation, construction, and engineering by the U.S. Army Corps of Engineers.—BTR

## BOSP Solicits Community Input

To fulfill its role in serving the ocean sciences community and the federal agencies that fund ocean activities, the Board of Ocean Science and Policy (BOSP) of the National Science and Policy (BOSP) of the National Science Foundation is calling for community input to a report on future trends and new opportunities in ocean science and policy through the year 2000.

BOSP is seeking information on the needs and opportunities in the field as broadly defined as ranging from augmentation of existing activities to new facilities to new ideas. In its first stage, the study will consist of a series of reports focused on 10 areas (see list below). The second stage will focus on themes that link the defined disciplines. Ideas and suggestions about linking themes also are welcomed for the BOSP report.

The areas of study and the scientists assembling information on them are listed below.

- Oceans 2000: Brian J. Rothschild (University of Maryland, Solomons) and John H. Steele (Woods Hole Oceanographic Institution)
- Physics: D. James Baker, Jr. (Joint Oceanographic Institutions, Inc.)
- Geology and geophysics: Charles L. Drake (Dartmouth College)
- Waste disposal: Edward Goldberg (Scripps Institution of Oceanography)
- Minerals: G. Ross Heath (Oregon State University)
- Policy science and law: Judith T. Kildow (Massachusetts Institute of Technology)
- Biology: James J. McCarthy (Harvard University)
- Weather and climate: Roger Revelle (University of California, San Diego)
- Chemistry: Karl K. Turekian (Yale University)
- Economics and business: Robert M. Sollow (MIT)

These reports, being prepared now, will be discussed at a meeting of BOSP in August. Before then, relevant information should be sent to the appropriate person or to Nancy

## TRAVEL GRANTS TO IASPEI REGIONAL ASSEMBLY HYDERABAD, INDIA

Deadline for Applications August 31, 1984

AGU has applied for grant funds to assist the travel of individual U.S. scientists to the IASPEI Regional Assembly to be held in Hyderabad, India, October 31-November 7, 1984. In anticipation of receipt of this funding, application forms for individual grants are available from:

American Geophysical Union  
2000 Florida Avenue, N.W.  
Washington, D.C. 20009  
(Telephone: 462-6903  
or toll free: 800/424-2488  
outside the Washington D.C. area)

Maynard, Executive Secretary, Board on Ocean Science and Policy, 2101 Constitution Avenue, Washington, DC 20418 (telephone: 202-334-2714).

## Geophysicists

Bruce A. Bolt, professor of seismology and director of the seismograph stations at the University of California, Berkeley, assumed the chairmanship last month of the California Seismicity Commission. Established by the state legislature in 1973 after the 1971 San Fernando earthquake, the commission advises the governor, state legislature, and local governments on all aspects of California seismic safety policy.

Yves Desautels, currently associate scientist at the Woods Hole Oceanographic Institution, is joining the Centre Océanologique de Bretagne in Brest, France. He will be in charge of the Ocean Acoustic Tomography program for the Centre National pour l'Exploitation des Océans (CNEXO).

## Books

### Proceedings of the Seventh Symposium on Antarctic Meteorites

I. Nagata (Ed.), *Mem. of Nat. Inst. of Polar Res.*, vol. 25, National Institute of Polar Research, Tokyo, iv + 348 pp., 1982.

Reviewed by Martin Prinz

Since the Japanese Antarctic Research Expeditions (JARE) of the National Institute of Polar Research (NIPR) in Tokyo began finding abundant meteorites in 1969, they have established a highly impressive record of developing the science of meteorites in Japan on a broad international scale. As a part of this effort they have held annual symposia in Tokyo, involving mainly Japanese scientists, some already well established in other areas, and an impressive array of younger ones. Some scientists from the United States and other countries also attend. The seventh symposium was held on February 19 and 20, 1982, at the NIPR.

Before reviewing the proceedings volume, a few words should be said about the meteorite milieu in which the conference is set. From a country involved only in a minor way with meteorite research 15 years ago, Japan has emerged as a major force on the scene, bringing forth new investigators as well as a stream of new meteorites. Much of this accomplishment is due to Takeshi Nagata, director of the NIPR, organizer of the symposia and editor of the volumes. He is helped by an able staff, both scientific and editorial, in producing the volumes, each of which increases in quality, breadth, and size as the years proceed.

At the seventh symposium, 47 papers were presented, and the proceedings volume contains 25 papers that may be classified into four groups: two on classification, eight on mineralogy and petrology, four on trace element and isotopic geochemistry, and four on physical properties.

Miura and Matsumoto classified six new Antarctic chondrites and were concerned with determining those that were paired. Mason and Clarke characterized and classified 100 new meteorite specimens. They also carry out this valuable work for the U.S. Antarctic program.

Ikeda studied a C3 chondrite containing various chondritic components, whereas Nagahara and Kishiro studied similar components in a C3 chondrite. Clarke and Mason described a new mesosiderite with some unusual aspects, and Nagahara studied FeNi metal in four different proveniences in type 3 ordinary chondrites to determine their cooling rates and implications for the parent body history. Takeda and Yanai examined Yamato 1979 achondrites, including eight polymict eucrites, a howardite, and a ureilite.

Polymict eucrites help in understanding the nature of the basaltic parent body, which is surely more complex than envisioned before the new Antarctic meteorites were found. The ureilite parent body is also more complex than earlier believed, as evidenced by the Antarctic ureilite described which contains a three pyroxene assemblage (two pyroxenes and an augite).

Merrillite in ordinary chondrites was examined by Miura and Matsumoto and found to differ somewhat from lunar mercurite. Akai studied five types of phyllosilicates in the matrix of a carbonaceous chondrite and suggested that it contains a new 1:1 mineral with an interstratified structure of sepioid-like and brucite-like layers.

Shimizu and Masuda found Ce anomalies and Yb-Lu deviations in the R.E.E. of Antarctic eucrites, but not in the non-Antarctic ones. These deviations were not found in other Antarctic meteorites, and they discuss the implications for pre- and post-terrestrial processes producing these effects. Takaoka studied the noble gases and isotopic compositions of He, Ne, and Ar in Yamato chondrites, and Yagi and coworkers studied Muong Nong tektites.

Isotopically, Nishimura and Okano found excess <sup>40</sup>Mg in a Yamato L3 chondrite, using an ion microprobe mass analyzer. Komura and coworkers concentrated on <sup>206</sup>Pb in Yamato meteorites, for which data of this type are scarce. They also note that Antarctic meteorites are highly contaminated with <sup>137</sup>Cs derived from nuclear test explosions.

McFadden and coworkers made spectral reflectance measurements on three Antarctic chondrites and observed measurable differences when all diagenetic spectra were compared. They found bands due to spin-forbidden transitions of Fe<sup>2+</sup> ions in pyroxenes for the first time. Fujimori and coworkers looked for preferred orientation of phyllosilicates in two Yamato C3 chondrites to relate to degree of deformation.

Nagata studied 16 iron meteorites and magnetically classified them into three groups. Nagata and Funaki were particularly concerned with tetraenite-rich stony meteorites and note that owing to its presence the NRM contains a highly stable component with large magnetic and optical anisotropy. They also studied the possible effects of mechanical stresses upon the magnetic properties of stony meteorites, the piezomagnetic magnetization (PRM).

Sugita and Strangway studied the magnetic properties of type 3 and 4 ordinary and enstatite chondrites and found complex results with regard to the intensities of the magnetic field at different temperatures and discuss whether these are pre- or post-accretionary events. Hamano and Yonemura studied magnetic susceptibility anisotropy and porosity in ordinary chondrites and found that

Books (cont. on p. 444)

## News

### Venus Mapper Resolution

NASA program managers for the Venus Radar Mapper (VRM) mission have decided to make improvements to the spacecraft's Synthetic Aperture Radar (SAR) system that will increase its mapping resolution by one and a half times over the original design. The changes, including a doubling of the system's range bandwidth, will add a total of about \$5 million to a project budgeted at \$350 million. VRM is scheduled for launch toward Venus in April 1988 and will map more than 80% of the cloud-covered planet's surface during its 8-month mission.

The decision by the VRM program office at NASA headquarters in Washington was based on recommendations from the mission's project office at the Jet Propulsion Laboratory in Pasadena, Calif. When VRM was included as a new start in this year's NASA budget, the stated goals for the mission were to provide a near-global map of Venus at resolutions better than 1 km, or roughly equivalent to the resolution of the Mariner 9 mission that first revealed the geological richness of the Martian surface. The actual best radar resolution was to have been about 180 m (equivalent to an optical line-pair resolution of 300 m) attainable for more than half the surface of the planet. VRM will travel an elliptical orbit and so will only be able to map the surface for a fraction of each day. The highest resolutions will come in the equatorial regions when the spacecraft is closest to perihelion and the radar "look angles" are the greatest.

Now, with the improvements to the SAR system, the resolution will range from 120 m (again for more than half the surface) to about 190 m in the higher Venus latitudes. This is nearly an order of magnitude better than what the Soviets have obtained with their Venera 15 and 16 orbiters now ending their mapping missions around Venus. Those spacecraft are mapping between 25 and 33% of the planet, primarily around the north polar region, at resolutions ranging between 1 and 2 km. While the Venera images have

proven very interesting to the few American scientists who have had access to them (the Soviets still have not released the pictures publicly), VRM promises much sharper images and more complete coverage.

It was the Venera results, in fact, that provided the impetus to make the improvements to VRM's radar system. "When our (VRM team) scientists looked at the Soviet images and began seeing all the interesting topography, they began to see how much more detail they wanted," says VRM Program Manager Rodney Mills. "We decided we wanted to squeeze out as much resolution as we possibly could." Gordon Penegill of the Massachusetts Institute of Technology, the radar instrument's Principal Investigator, says that at resolutions close to 100 m, scientists should be able to detect all the processes that might shape the Venusian surface with the exception of wind erosion. The clarity of the VRM images will be particularly helpful in dating the relative ages of overlapping lava flows on the surface.

According to Mills, the improvements to the radar system will affect range resolution, but won't significantly affect the azimuth resolution of the images. The SAR instrument, built by Hughes Aircraft, is the only science instrument on the VRM spacecraft, which is being built by Martin Marietta. The radar is similar to the ones that have been flown successfully on the Seasat mission and the Shuttle Imaging Radar-A (SIR-A) experiment that flew onboard Columbia during the second flight of the space shuttle. It operates on the principle that changes in doppler shift of a reflected signal can be combined with range data to construct two-dimensional images of a planet's surface that resemble photographs. Because Venus is perpetually enshrouded by clouds, radar is the only means to image its surface.

Venus Radar Mapper will also soon have a new name. NASA officials have been whittling away at a list of candidate names that include some historical figures (along the line of Galileo and Gluto) and some more traditional spacecraft names (along the line of Voyager and Pioneer). VRM is expected to shed its acronym and be "re-christened" sometime before the end of July. —TR







## FSRI, Univ. of South Carolina, Columbia, SC 29208-0001.

F.S.R.I., Univ. of South Carolina, Columbia, SC 29208.)

Oct. 16-19 **Satellite Symposium on National Energy Issues**, Space Station, Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99362.)

Oct. 16-19 **International Symposium on Lakes and Watershed Management**, University of North Carolina, Lake Management Society, (Harry Gibson, Jr., Dept. of Civil and Environmental Engineering, Washington State Univ., Seattle, WA 98195, WA 98164-2912.) (March 6, 1991.)

Oct. 17-19 **AIPEG Annual Meeting**, Orlando, FL, (Hobby J. Timmons, General Chairman, Timmons Associates, Inc., 1000 N. Orange Ave., Suite 101, 32255.) tel.: 904-246-1533.

Oct. 17-19 **CRIELIARO Workshop on the Interaction of Radar with the Seasonal Snow Cover**, Cold Regions Research and Engineering Laboratory, Hanover, N.H. Sponsors: CRIELIARO, AGU Hydrology Section, U.S. Col. Lock, CRIELI, 72 Lynde Road, Hanover, NH 03753.)

Oct. 19-21 **Chapman Conference on Vertical Crustal Motion: Measurement and Models**, Harpers Ferry, W. Va. Sponsors: AGU (Vertical Crustal Motion Meeting, AGU, 2000 Foothill Parkway, Suite 100, 91068-1000, California 91068-1000) tel.: 916-231-6100 or toll-free 800-244-2488.)

Oct. 21-29 **Short Course on Engineering and Economic Assessment of Geothermal Resources**, Stanford Univ., (S. J. Yeh, Director, Geothermal Resources Council, (Grace Mata, Geothermal Resources Council, P.O. Box 1350, Davis, CA 95617-1350.) tel.: 916-738-2360.)

Oct. 21-25 **5th Annual Meeting of the International Union, Wm. J. Robert Moore, Program Chairman**, Univ. of Texas at Austin, Marine Science Institute, 200 East 3rd St 182 St, Austin, TX 78705; tel.: 512-471-0416.)

Oct. 21-25 **Conf. on New Methods for Evaluation of Groundwater Contamination Sites**, East Lansing, Mich. Sponsors: Michigan Dept. of Natural Resources, Michigan State Univ., Michigan Dredging Authority, Michigan State Univ., Michigan Dept. of Natural Resources, Stevens T. Mason Building, Box 30028, Lansing, MI 48909.)

Oct. 29-31 **Conference on Geopotential Measurements**, Houston, Texas. Sponsors: NASA, M. Squire, National Aeronautics and Space Administration, (L. Walter, Code E-8, NASA Headquarters, Washington, DC 20545.) tel.: 202-325-1075.)

Oct. 29-31 **Symposium on Groundwater: The Unseen Crisis**, Austin, Tex. Sponsors: Texas A & M University, University of Texas at Austin, (Ernst J. Shender, Center for Research in Groundwater Resources, 1000 University Blvd., Austin, Building 119, 10010 Burnet Road, Austin, TX 78758-1497.) tel.: 512-433-3112.

Oct. 29-31 **Symposium on Lunar Bases and Space Utilization**, Houston, Texas. Sponsors: NASA Johnson Space Center, (Michael Duke, 7705 N. Loop West, Houston, TX 77057.) tel.: 713-183-1611.

Oct. 30-Nov. 3 **Symposium on Relationship Between Climate of China and Global Climate—Past, Present, and Future**, Beijing, China. Sponsors: Academia Sinica, International Association of Agricultural Meteorologists (IAAM), Chinese Meteorological Society, (Jin-Ping Chang, Institute of Atmospheric Physics, Academia Sinica, Beijing, China 100029.)

Oct. 31-Nov. 7 **Regional Assembly of IASPEI Hyderabad**, India. (Mohan L. Gupta, Organizing Committee, IASPEI Regional Assembly, 10000 Hyderabad 500 007, India.) tel.: 153-478 NCRG IN; cable: geophysics; (Aug. 2, 1988.)

Nov. 1-5 **Geological Geophysical Union Annual Meeting**, La Paz, Baja California Sur, Mexico. (Union Geofisica Mexicana, A.C., Comité Organizador Reunion 1994, Apartado Postal 1803, Ensenada 22800, B.C.N. Mexico.) tel.: 52-664-228000.

Nov. 5-8 **GSA Annual Meeting**, Reno, Nevada. (Jean Lutzinger, GSA, P.O. Box 9140, Boulder, CO 80501.) tel.: 303-447-2920.

Nov. 5-10 **Illinois Land Use and Natural Resource Management Conference**, Springfield, Ill. Sponsors: Univ. of Illinois Water Resources Center, AWRA Illinois section, North American Land Use Management Society, Illinois Natural Resources Center, Univ. of Illinois at Urbana-Champaign, 2535 Hydraulics Laboratory, 208 North Romaine St., Urbana, IL 61801; tel.: 312-955-0525 (June 1991.)

Nov. 11-16 **Engineering Foundation Conference on Groundwater Contamination**, San Barbara, Calif. Sponsors: The Engineering Foundation, Universities Council on Water Resources, (Eugene E. Rouse, 100 University Ave., 47th St., New York, NY 10017; tel.: 212-279-7835.)

Nov. 17-19 **Water for South Africa**, Johannesburg, South Africa. Sponsors: National Water Act, Well Assoc. and the Borehole Water Association Southern Africa. (David M. Nielsen, Conference Coordinator, NWSWA, 500 W. Wilson Blvd., Waco, TX 76798.) tel.: 817-846-9355.) (Dec. 18, 1989.)

Nov. 13 **Conference on Water Resources and Salinization**, Johannesburg, South Africa. Sponsors: National Water Act, Well Assoc. and the Borehole Water Association Southern Africa. (David M. Nielsen, Conference Coordinator, NWSWA, 500 W. Wilson Blvd., Waco, TX 76798.) tel.: 817-846-9355.) (Dec. 18, 1989.)

Nov. 13-15 **Optics Through Time**, Tucson, Arizona. (Jacqueline Desmet, University of Nancy I, Faculté des Sciences, Laboratoire Pétrologie, B.P. no. 239, F-54300 Vandœuvre-lès-Nancy, Cedex, France.) (June 1991.)

Nov. 14-15 **Coastal Zone and Continental Shelf Conflict Resolution**, Cambridge, Mass. Sponsors: Massachusetts Institute of Technology, Sea Grant Program, (John R. Garritt, MIT Sea Grant Information Center, 77 Waterhouse Ave., Building F-38-301, Cambridge, MA 02139.) tel.: 617-255-7041.)

Nov. 14-20 **VIIth World Technical Conference on Urban Climatology**, Mexico City, Mexico. Sponsors: World Meteorological Organization, World Health Organization, (T. L. S. Chan, World Meteorological Organization, 41, rue de Motta, Case postale No. 8, CH-1286 Geneva 80, Switzerland.) (June 1992.)

Nov. 19-30 **Workshop on Environmental Hazards for Nuclear Waste Management**, Budapest, Hungary. Sponsors: Materials Research Society (John Stone, E. du Pont de Nemours and Company, Health, Safety and Environmental Laboratory, Alken, 29008.) (May 8, 1994.)

Nov. 27-30 **Thirtieth Annual Meeting of Magnetism and Magnetic Materials**, San Diego, Calif. Sponsors: American Physical Society, Magnetics Society of IEEE, (S. J. Pickart, American Institute of Physics, 552 45th St., New York, NY 10017.) (June 1991.)

**of Pacific Basin Society**, University of California at San Diego, La Jolla, CA 92037; PAC/CHEM '84, Meetings and Divisional Activities Dept., #4, 1155 16th St., N.W., Washington, D.C. 20036; tel.: 202-872-4300; PAC/CHEM '84, Chemical Institute of Canada, 151 Street St., Suite 800, Ottawa, Ontario K1P 5H3, Canada; tel.: 613-233-5023; PAC/CHEM '84, Chemical Society of Japan, 1-1 Kanda-Surugadai, Chiyoda-ku, Tokyo 100, Japan; tel.: 03-292-61191; (Sept. 13, 1983).

**Dec. 17-21 Tectonic Studies Group 16th Annual General Meeting.** Sponsor: U.S. State Univ.; University College of Swansea. (Richard Lisle, Dept. of Geology, University College, Swansea SA2 8PP, United Kingdom).

**Dec. 28-31 44th International Conference on Applied Numerical Modeling.** Sponsors: Tsinghua (S.-Y. Wang), School of Engineering, Univ. of Mississippi, University, MS 38677; tel.: 601-232-7210.

**1985**

**Jan. 7-12 17th International Congress on Hydrogeology of Rocks of Low Permeability.** Tucson, Ariz. Sponsor: International Assoc. of Hydrogeologists, AGU, E. S. Simpson, Dept. of Hydrology and Water Resources, College of Engineering, Univ. of Arizona, Tucson, AZ 85721.

**February 1-5 1st Symposium on Recent Crustal Movement.** Maracaibo, Venezuela. Sponsor: International Assoc. of Geodesy. (Heinz Helmreich, Apartado 6, Maracaibo, Venezuela; telex: 222222 ZAMER VZ.)

**Feb. 1-22 Sixteenth Annual Conference on Erosion Control Practices and Research.** San Francisco. Sponsor: International Erosion Control Assoc. (Gerry Heister, Progress Engineering Chairman, International Erosion Control Assoc., Inc., P.O. Box 807, Freedom, CT 05919; (May 29, 1984).

**March 10-16 American Society of Photogrammetry and American Congress on Surveying and Mapping National Meeting.** Washington, D.C. (Willard A. Kincaid, 4415 Jensen Pl., Fairfax, VA 22032; tel.: 703-423-8750).

**March 11-15 Sixteenth Lunar and Planetary Science Conference.** Houston, Tex. Sponsor: Lunar and Planetary Institute, AGU, NASA/Johnson Space Center, Division for Planetary Science of the American Geological Society. (John G. Taylor, Lunar and Planetary Science Conference Administrator, Lunar and Planetary Institute, 3303 NASA Road 1, Houston, TX 77030; tel.: 713-486-2150.)

**March 18-21 International Conference on New Methods in Science and Engineering.** Arlington, Texas. Sponsor: Univ. of Texas at Arlington. (Fred R. Payne, A.E. Dept., UT-Arlington, 76019; tel.: 817-275-2071.)

**April 1-12 European Union Geosciences Joint Council Meeting.** Strasbourg, France. (Organizing Committee, Dept. of Earth Sciences, Univ. of Cambridge, Downing St., Cambridge CB3 9EQ, U.K.).

**April 11-19 CSA Pentrose Conference on Geomorphic and Stratigraphic Indicators of Neogene-Quaternary Climatic Change in Arid and Semiarid Environments.** Tucson, Ariz. Speakers: John Dolanewald, USGS; Steve Wells and Les McAladden, Univ. of New Mexico. (John Dolanewald, U. S. Geological Survey, MS 941, 3415 Middlefield Rd., Menlo Park, CA 94025.)

**April 19-19 First International Symposium Precise Positioning with the Global Positioning System.** Rockville, Md. Sponsor: IAGC/USCGE, Defense Mapping Agency, NOAA. (Positioning with GPS-1985, White Flint Main Post Office Box 2058, Kensington, MD 20895.)

**April 19-18 Fifth Annual AGU Front Range Branch Hydrology Days.** Fort Collins, Colo. (H. J. Morel-Seeyoux, Dept. of Civil Engineering, Colorado State Univ., Fort Collins, CO 80523; tel.: 303-491-5448 or 8549.) (July 1, 1984).

**April 18-20 Continental Extensional Tectonics.** Durham, England. Sponsor: Geological Society. (J. F. Dewey, Dept. of Geological Sciences, Durham University, Durham DH1 1TA, England.)

**April 21-26 Third International Symposium on the North American Vertical Datum.** Rockville, Md. Sponsor: IAGC, NOAA, National Geographic Society, NOAA. (Director, NAVD Symposium 85, White Flint Mall, P.O. Box 2058, Kensington, MD 20895; tel.: 301-443-8567.)

**April 28-May 1 International Conference on Arctic Water Pollution Research: Applications of Science and Technology.** Yellowknife, Northwest Territories, Canada. Organizer: Canadian National Committee, International Assoc. on Water Pollution Research and Control. (K. Charbonneau, National Research Council of Canada, Montreal Road Laboratories, Ottawa K1A 0R8, Canada; tel.: 613-983-0000.)

**April 30-May 1 Symposium on Watershed Management.** Denver, Colo. Sponsor: American Society of Civil Engineers. (E. Bruce

**31st Pac Region Septem Oregon Corv Convenors: Robe Abstract Des Call for Papers w For information on the abstract or other meeting logistics con Meetings Department American Geophysical Un 2000 Florida Avenue, N.W**

**May** Symposium on Hydrothermal Alteration and Geochemical Brine Chemistry, Processing, and Mineral Recovery, Palm Springs, Calif. Sponsors: Geothermal Resources Council, (Grace Minto, Geothermal Resources Council P.O. Box 1330, Davis, CA 95617-1330; tel.: 916-758-2360).

**May 6–10** Symposium on Vertical Motion in the Equatorial Upper Ocean and its Effects on Living Resources and the Atmosphere, Paris, France. Sponsors: Scientific Committee on Oceanic Research, UNESCO. (David Harper, NOAA PMEL, 7600 Sand Point Way NE, Seattle, WA 98115).

**May 7–8**, Third ECSC (Japan and East Coast Sea Study) Workshop, Tsukuba University, Japan. Sponsors: Japan Marine Science and Technology Center, Oceanographical Society of Japan, Japanese-French Oceanographic Society, Takasaki Univ., Dept. of Oceanography, Texas A & M Univ., College Station, TX 77843.

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**June** Second International Conference on Dynamics and Earthquake Engineering, Istanbul, Turkey. Sponsors: Turkish Ministry of National Mechanics Institute, (C. A. Breti, Computational Mechanics Institute, Ashraf Lodge, Ashurst, Southampton SO4 2AA, England).

**July 1–8** International Conference on Marine Dyke Swarms, Mississauga, Ontario, Canada. Sponsors: IUGS Commission on Tectonic and Sedimentary Basins, Geological Survey of Canada, (H. Halls, Erlindale Campus, Univ. of Toronto, Mississauga, Ontario L5L 1C6, Canada; tel: 416-828-5363).

**June 9–18** IAGRA Fifth World Congress, Brussels, Belgium. Fifth World Congress on Ice Resources, Brussels International Centre Office, Parc des Expositions, Tennotestellingpark, B-1020 Brussels, Belgium; tel: 32-2-778-18-60; tele: 23-613, fax: 23-51.

**June 10–21** Third International Symposium on Analysis of Seismicity and Seismic Risk Lubice, Czechoslovakia. (Z. Scherovský, Czechoslovak Academy of Sciences, 14131 Prague, Czechoslovakia).

**June 20–28** U.S. Symposium on Rock Mechanics, Rapid City, S. Dak. Sponsors: South Dakota School of Mines and Technology, W. Stien, Dept. of Civil Engineering, Highway and Water Resources Program, Fourth Campus, Colorado State Univ., Fort Collins CO 80523.

**July 28–Aug. 9** Tsunami 85: International Tsunami Symposium of the IUGG/Tsunami Commission, Victoria, Canada. (Tsunamini P.O. Box 2247, Sidney, B.C., Canada V8R 8S8; tel: 604-630-8353).

**August** International Workshop on Hydraulic Applications of Space Technology to Hydrologic Models and Geographic Information Systems, Phoenix, AZ. Sponsors: IAHS, (A. Ivan Johnson, Peckham Technology Transfer Committee on Remote Sensing and Data Transmission, 7414 Upham Court, Austin, TX 78703; tel: 800005).

**Aug. 5–16** IAMAP/APASO Joint Scientific Assembly on the Large Scale Circulation of Gases and Atmosphere and their Interactions, Honolulu, Hawaii. Sponsors: IAMAP/APASO, AGU, (AGU, 2000 Florida Ave., Washington, DC 20006).

**Aug. 17–27** Symposium on Magnetic Anomalies over the Margins of Continents and Plates, Prague, Czechoslovakia. Sponsor: International Assoc. of Geomagnetism and Aerogeophysics, (William H. Flugge, Dept. of Geosciences, Purdue Univ., West Lafayette, IN 47907; tel: 317-494-3982.) (Feb. 7, 1986).

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Aug. 10-24 Fourth Chit  
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916-758-2560.)

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Sept. 18-30 Sixth Intern  
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Sept. 10-21 Symposia on  
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**Aeronomy**

0450 Pressure, density and  
OBSERVATIONS BETWEEN THERMO  
ZONE, SOLAR EUV FLUX, AND  
A. K. Mishra (Aeronomical  
Space Flight Center, Greenh  
simultaneously measure  
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J. Geophys. Res., A, Paper

0460 Tides, waves and wind  
NIGHTTIME VARIATION OF TIDE  
OVER FORT FRITZ PEAK OBSERV  
STATION OF MARCH 2, 1993  
G. Hernandez (Naval Labor  
82030), R.E. Noble (Labor  
Researcher, Boulder, CO 8050  
NIGHTTIME DEMOGRAPHY OF  
measured over Fritz Peak Obs  
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